

Task Order:

Task Description	Date	Time	CS Staff	CT Staff	S/W used	Ref. material provided? YES/NO	What was accomplished	Links (scripts, runs, PowerPoints, etc.)	Pros	Cons
Model Volume Adjustments: Testing, Debugging, and Adjusting the Post Processor Tool TransCAD Training: Continuation of TransCAD Training	9/27/2016 & 9/28/2016	9:00 a.m. to 5:00 p.m.	Ramesh Thammiraju & Chao Wang	Shahmiri Ali Hanwen Yi Wei Xia Sarah Ramos (& Maurice Eaton if desired)	TransCAD / GISDK	Yes - we will provide digital files of ppt slides and GISDK code at the end of the sessions				

**Describe Modeling and Forecasting knowledge level improvement for each staff member*

AGENDA

Day 1: Tuesday (10/18/2016)

Start at 9:00 a.m. (All attendees)
 9:00 a.m. - Noon Training sessions overview (what we will be working and accomplishing in the two day working sessions) – CS staff
 Discuss Tool adaptation: using the loaded network vs. SANDAG assignment outputs (.bin files) directly.
 - CS will show the modifications to the tool to use the loaded network as input instead of using the separate .bin files – CS staff
 - We can discuss the SANDAG ABM version changes as well.
 Presentation about SANDAG Series 12 advanced 4-step EmFAC process, air quality – Hanwen
 Noon - 1:15 p.m. Lunch break
 1:15 p.m. - 5:00 p.m. Use the updated loaded network inputs and enhanced tool to fill the peak hour volume fields
 Tool debugging and testing (...hands-on training using TransCAD)

Day 2: Wednesday (10/19/2016)

Start at 9:00 a.m. (Ali + Sarah + Ramesh)
 9:00 a.m. - 5:00 p.m. TransCAD 101 Hands-On Session
 Refresher: Review previous practice exercises and respond to questions using the OLD VERSION Post Processor Tool
 TransCAD Basic 101 Practices using the enhanced Post Processor Tool
 Review Table of Contents for TransCAD PPT, and list of commonly used formulas for TransCAD

Start at 9:00 a.m. (Wei + Chao)
 9:00 a.m. - 5:00 p.m. Advanced TransCAD Hands-On Session
 Detailed discussion on EmFAC air quality tool
 Subarea OD extraction and analysis
 Advanced network manipulations (partitioning a network)



a brief discussion on

Air Quality Analysis

— Background, Methodology & Procedure

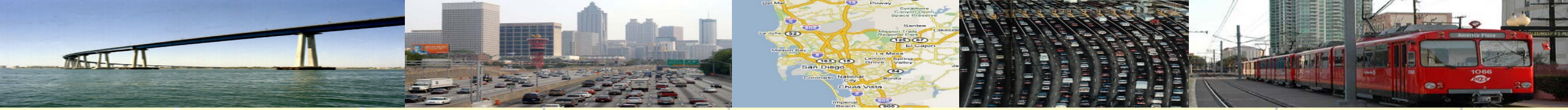
Oct. 18, 2016

Hanwen Yi
Caltrans/D11/Planning



CALIFORNIA DEPARTMENT OF TRANSPORTATION
PLANNING DIVISION
Planning Leads To Superior Solutions

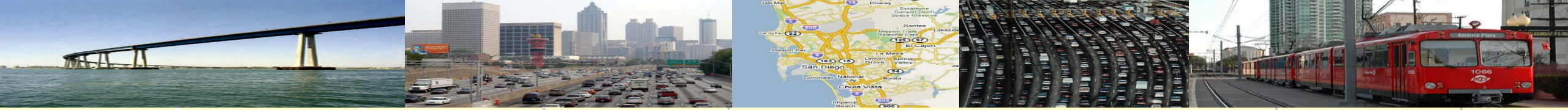
Caltrans
DISTRICT 11



Background

2 Types of Air Quality Analyses

- GHG (Green House Gas)
 - regional
 - tool: EmFAC(latest: EmFAC2014)
- MSAT (Mobile Source Air Toxics)
 - local level, project-specific
 - tool: CT-EmFAC(latest: CT-EmFACv6.0)



Methodology for GHG Analysis

EmFAC

California Environmental Protection Agency
Air Resources Board

<https://www.arb.ca.gov/emfac/2014>

SANDAG
Model run



burdenann2.wis
burdensum2.wis
burdenwin2.wis

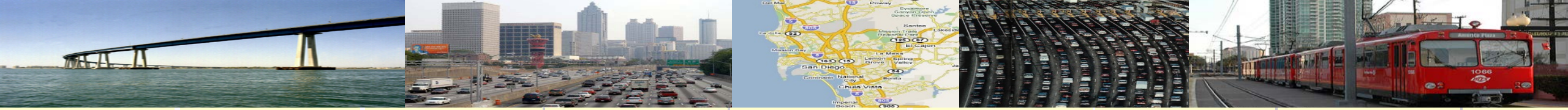


EMFAC



Total Emissions

Pollutant	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	22,220.833714	22.220834	0.024494276
SO2	647.372000	0.647372	0.000713605
PM10	2,471.784000	2.471784	0.002724675
NOX	102,520.184000	102.520184	0.113009158
CO2	30,471,388.076000	30,471.388076	33.588955736
CO	340,517.672000	340.517672	0.375356481



Methodology for MSAT Analysis

CT-EmFAC

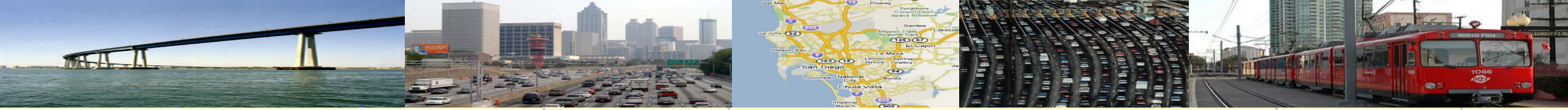
<http://www.sonomatech.com/project.cfm?uprojectid=518>



SANDAG
Model run →

Post-process:
Prepare data to input
to CT-EmFAC

→ CT-EMFAC



Procedure

EmFAC for GHG Analysis

- data available directly from regional Model

CT-EmFAC for MSAT Analysis

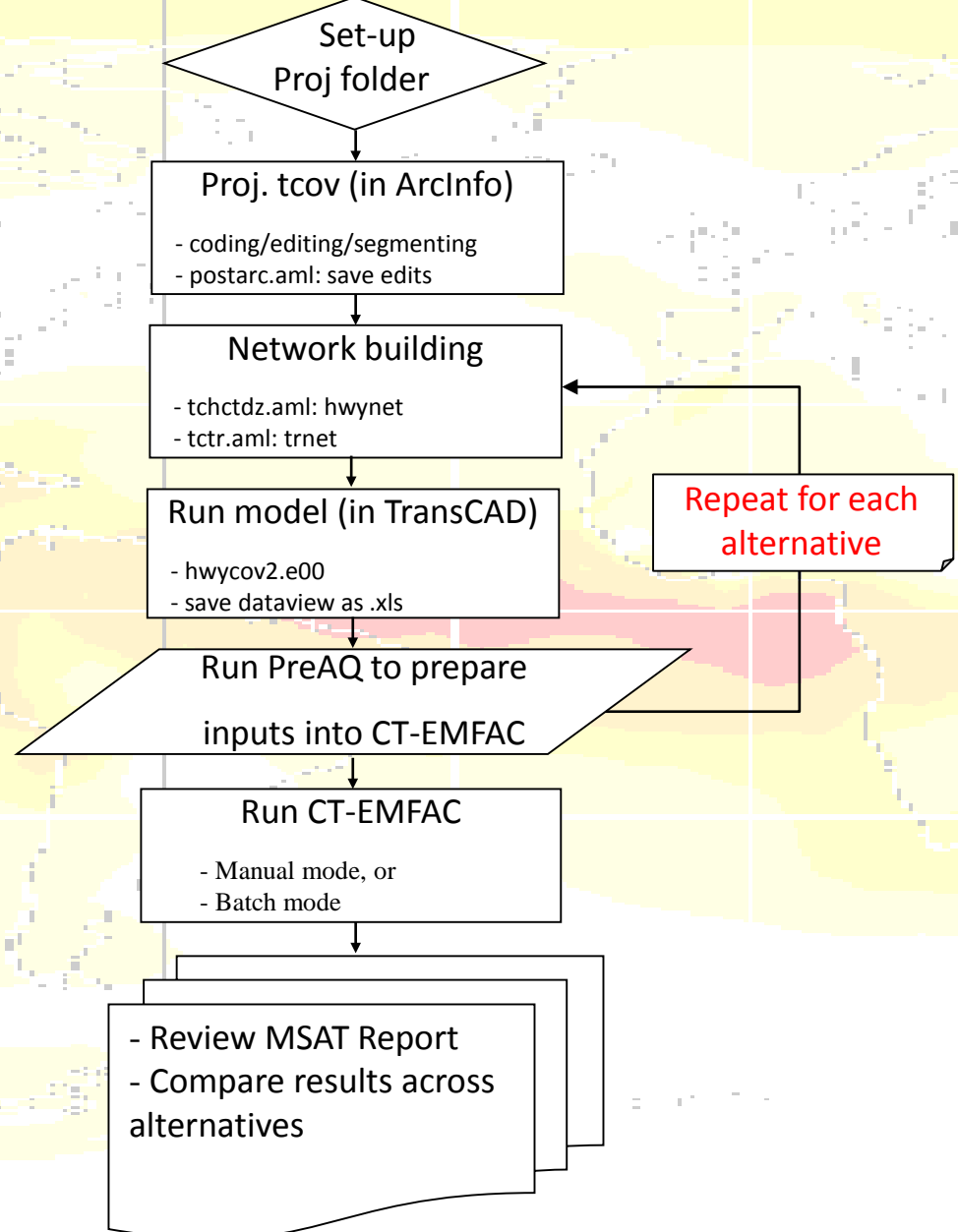
- no luck with easy data
- procedures to prepare data as input



Procedure

MSAT Analysis

Flowchart





Procedure

MSAT Analysis

Steps in detail

1. Set up Sandag model for a project
 - 1.1 create study folder and sub-folders for each alternatives
 - 1.2 copy tcov (transportation coverage) and files from Sandag standard model
 - 1.3 edit files such as readme, year, hwyproj, head, etc.
2. Edit project tcov (in ArcInfo Environment)
 - 2.1 conduct normal network coding for the project
 - 2.2 split links, define segments, assign segment IDs for each link manually (this is the extra workload required to meet the MSAT needs, and the most labor-intensive and time-consuming step)
 - 2.3 run postarc.aml to save all the edits
3. Network building (in ArcInfo Environment)
 - 3.1 run tchctdz.aml to build highway network
 - 3.2 run tctr.aml to build transit network



Procedure

MSAT Analysis

Steps in detail

4. Run the 4-step model (in TransCAD Environment)
 - 4.1 run Sandag 2-stage procedure and post processing
 - 4.2 save dataview as Excel .xls file
5. Run preAQ to prepare inputs for CT-EMFAC
6. Repeat steps 3, 4, and 5 for
 - base year
 - opening year no build
 - opening year build
 - horizon year no build
 - horizon year build
7. Run CT-EMFAC (batch mode)
8. Review and compare results cross alternatives



Procedure

CT-EmFAC (v4.0)

CT-EMFAC v4.0

Title | About | **Manual Mode** | Batch Mode

Emission Factors | **Emission Calculations**

Title:

Emission Factors: Current Select a Saved Scenario:
 ...

Travel Activities: VMT Volume and Road Length

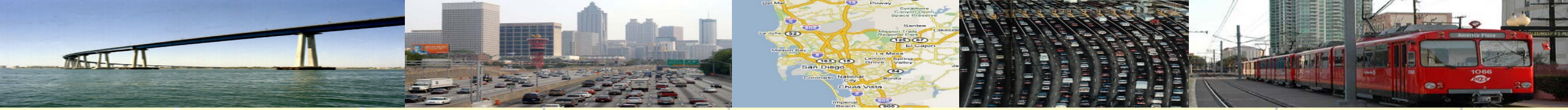
Peak

	Total VMT		Volume (vph)		Road Length (mi)		Number of Hours		
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
VMT Distribution by Speed (mph)	5	10	15	20	25	30	35	40	
	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	
	45	50	55	60	65	70	>70	Sum	
	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> 100 %	
Average Vehicle Idling Time (min/hr)	<input type="text"/>							(currently unavailable)	

Off Peak

	Total VMT		Volume (vph)		Road Length (mi)		Number of Hours		
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
VMT Distribution by Speed (mph)	5	10	15	20	25	30	35	40	
	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	
	45	50	55	60	65	70	>70	Sum	
	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %	<input type="text"/> 100 %	
Average Vehicle Idling Time (min/hr)	<input type="text"/>							(currently unavailable)	

Pollutants: TOG CO NOx SO2 CO2
 PM10 PM2.5 Diesel PM DEOG
 Benzene Acrolein Acetaldehyde Formaldehyde 1,3-Butadiene



Procedure

CT-EmFAC(2014 v6.0)

CT-EMFAC2014
Version 6.0



© California Department of Transportation

CT-EMFAC2014

Title | Manual Mode | Batch Mode | Help

Emission Factors | Emission Calculations

Set Up Analysis Scenario

Emission Factor File Name (*.EF):

Emission Calculation File Name (*.EC): Auto Generate

Review Scenario Information

Geographic Area:

Analysis Year:

Season:

Vehicle Mix

Truck:	%
Truck 1:	%
Truck 2:	%
Non-Truck:	%

Available Pollutants

MSATs

Input Travel Activities

Road Length: miles

Volume: vehicles/hour

Number of Hours: hours

Avg. Idling Time: minutes/vehicle

(required when idle emissions are estimated)

VMT Distribution by Speed Bin (mph)

≤ 5:	<input type="text"/> %	30:	<input type="text"/> %	55:	<input type="text"/> %
10:	<input type="text"/> %	35:	<input type="text"/> %	60:	<input type="text"/> %
15:	<input type="text"/> %	40:	<input type="text"/> %	65:	<input type="text"/> %
20:	<input type="text"/> %	45:	<input type="text"/> %	70:	<input type="text"/> %
25:	<input type="text"/> %	50:	<input type="text"/> %	>70:	<input type="text"/> %
Sum: <input type="text"/> %					



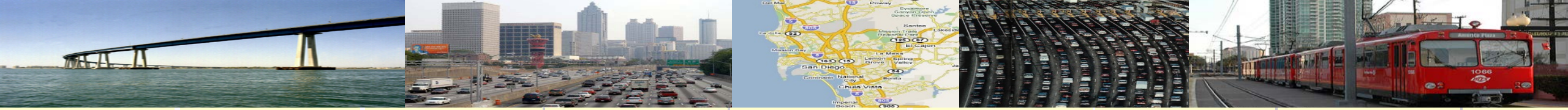
Procedure

Input data & format

VMT Distribution by Speed by Segment

I-805 South, 2030 Build

	Speed Range	Entire Corridor						Segment1		Segment2		Segment3		Segment4		Segment5		Segment6	
		Tot VMT	Tot %	PK VMT	PK %	OP VMT	OP %	PK %	OP %	PK %	OP %	PK %	OP %	PK %	OP %	PK %	OP %	PK %	OP %
1	<5 mph	0	0.00	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5 mph ~ 10 mph	0	0.00	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	10 mph ~ 15 mph	43424	0.85	43424	2.28	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.70	0.00	2.79	0.00
4	15 mph ~ 20 mph	8496	0.17	8496	0.45	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	20 mph ~ 25 mph	12404	0.24	0	0.00	12404	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.50	0.00	5.46
6	25 mph ~ 30 mph	13331	0.26	13331	0.70	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	30 mph ~ 35 mph	25156	0.50	25156	1.32	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	35 mph ~ 40 mph	37050	0.73	37050	1.95	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.05	0.00	1.72	0.00
9	40 mph ~ 45 mph	146274	2.88	45216	2.38	101058	3.18	0.00	0.00	0.00	0.00	0.00	0.00	6.97	0.00	5.49	0.00	0.00	0.00
10	45 mph ~ 50 mph	82174	1.62	56743	2.98	25431	0.80	0.00	0.00	0.00	0.00	0.00	0.00	18.54	0.00	18.68	2.69	0.76	0.00
11	50 mph ~ 55 mph	240617	4.74	151268	7.95	89349	2.81	3.77	0.00	6.41	0.00	23.66	0.00	0.00	0.00	6.78	0.00	10.45	0.00
12	55 mph ~ 60 mph	549561	10.82	322771	16.97	226790	7.14	4.29	0.00	9.24	0.00	12.04	0.00	24.62	0.00	28.42	0.00	36.48	0.00
13	60 mph ~ 65 mph	1138767	22.42	330963	17.40	807804	25.42	14.98	7.21	33.20	0.00	19.19	0.00	3.52	11.60	2.87	9.08	18.15	0.00
14	65 mph ~ 70 mph	2782976	54.78	867367	45.61	1915609	60.27	76.97	92.79	51.14	100.00	45.11	100.00	46.35	88.40	35.02	84.73	29.66	94.54
15	>70 mph	0	0.00	0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	5080231	100.00	1901785	100.00	3178446	100.00	118532	195365	105403	159497	42403	62305	116253	172884	85354	127665	92582	145197



Procedure

Input data & format

Differences between v4.0 and v6.0

- Naming of segmentation:
v4.0: segment1, segment2,
v6.0: link1, link2,
- Additional data for v6.0
total idling time (hours) for each link(segment)



Procedure

Project

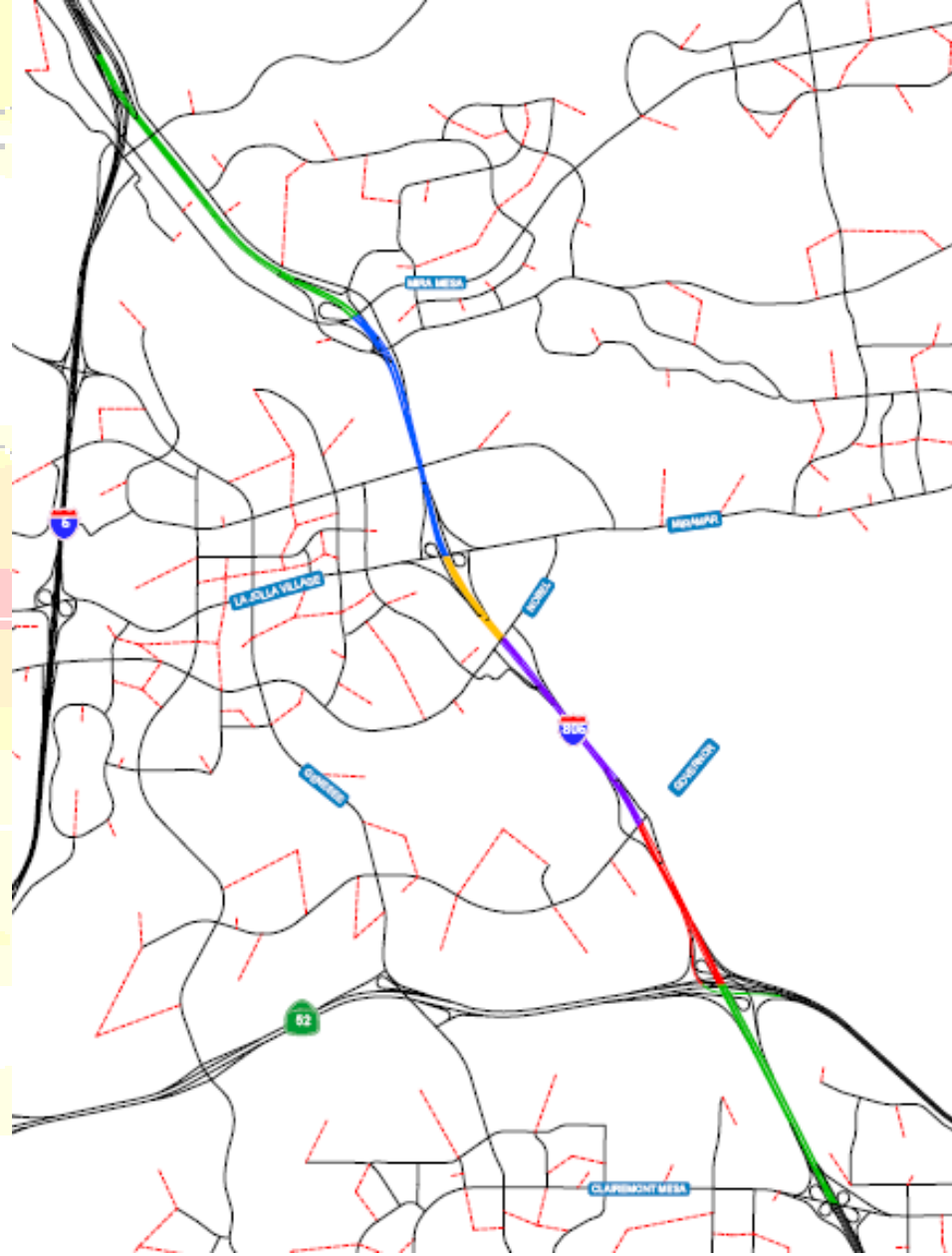
- A freeway corridor
- A discontinued freeway corridor
- A combination of freeways, ramps, and/or connectors
- A project contains multiple segments

Segmentation

- A stretch of freeway between two consecutive interchanges
- Freeway ramps/connectors connecting two freeways
- A segment contains multiple links



Procedure



Examples:

I-805 from the split of I-5 and I-805 to Claremont Mesa

SR-94 from I-5 to Euclid

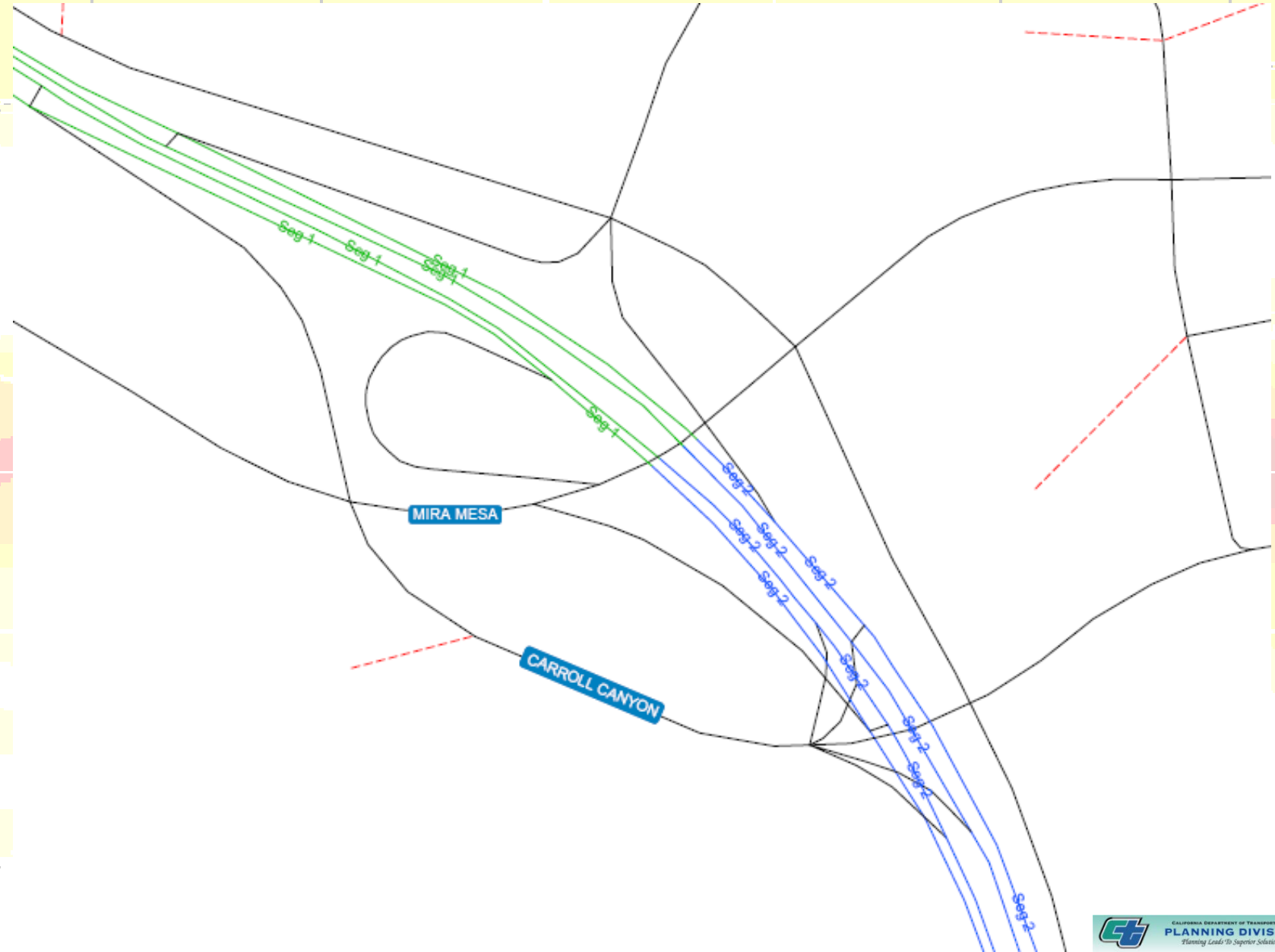


Procedure

Segmentation

- Split links
- Assign SegIDs

Using the PLOT attribute included to assign SegID to links within project limits





Procedure

Segmentation

- checking

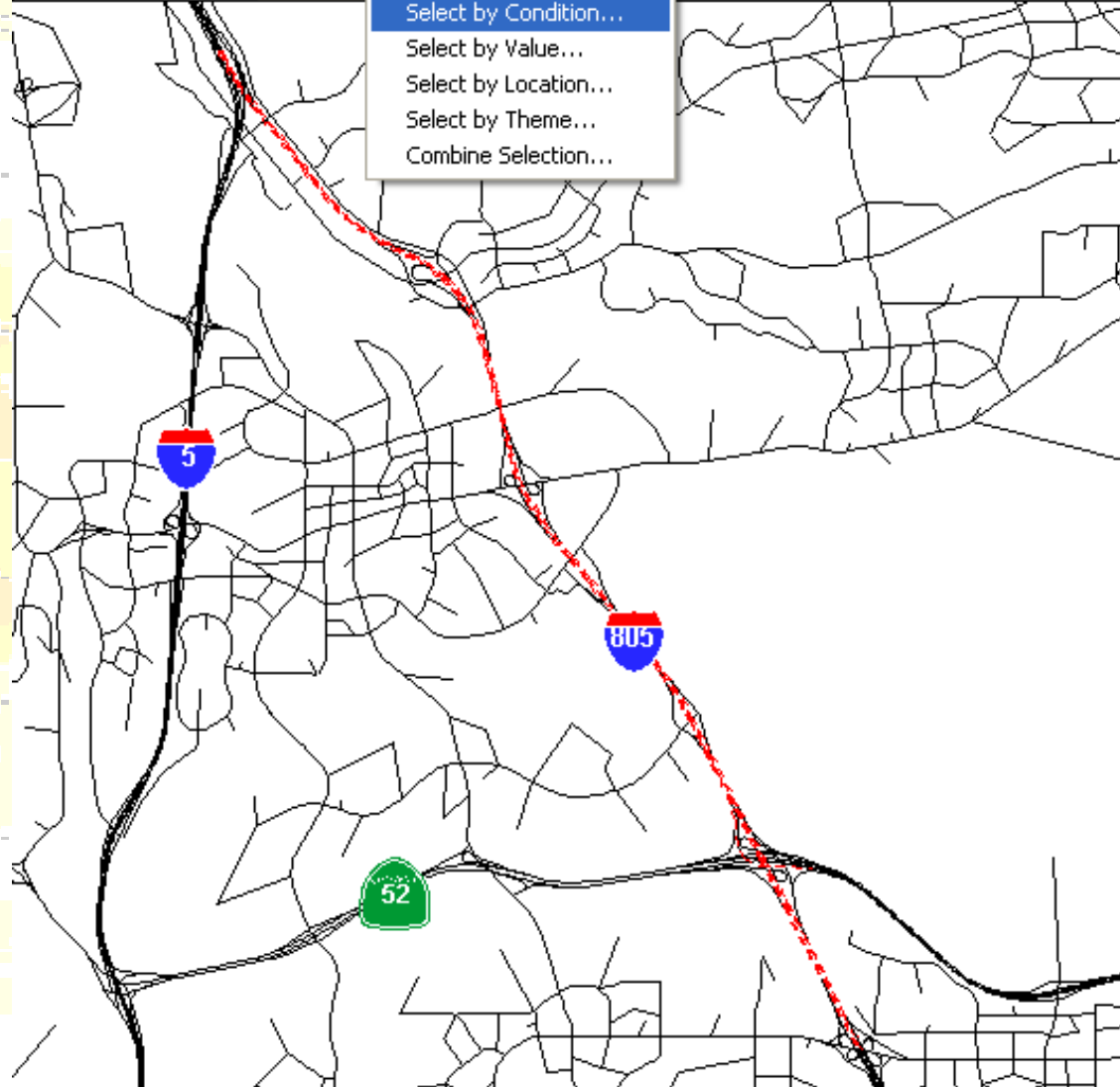
TransCAD (Licensed to Caltrans) - [Map1 - 2030b]

File Edit Map Dataview Selection Matrix Layout Tools Procedures Networks/Paths Rout

2030b

Settings...

- Select by Condition...
- Select by Value...
- Select by Location...
- Select by Theme...
- Combine Selection...



Select by Condition (Dataview: 2030b)

Enter a Condition
PLOT <> 0

Condition Builder

Field List...
Operator List...
Function List...
Values...

Set Name
Selection

Selection Method
Create Set

Previous Conditions
PLOT <> 0

Select from visible features only

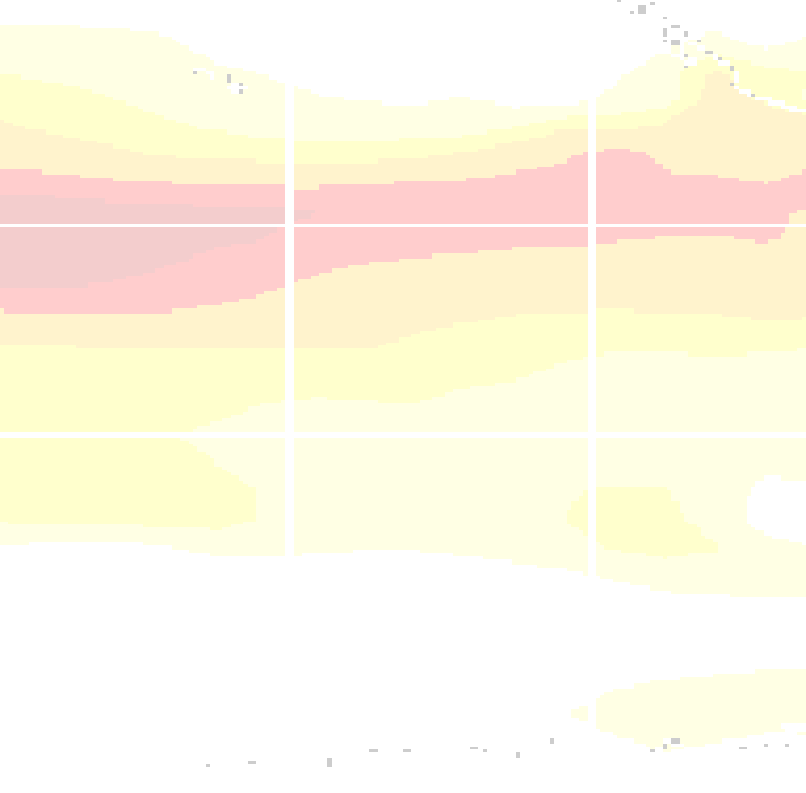
OK
Cancel
Verify
Clear
Save...
Load...



Procedure

Segmentation

- checking

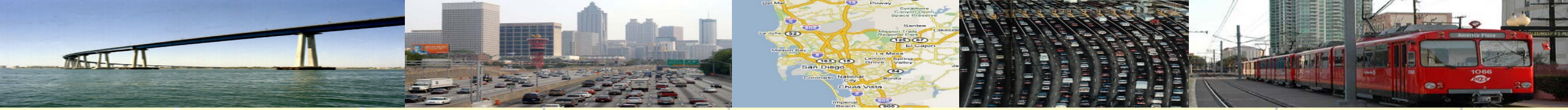


TransCAD (Licensed to Caltrans) - [Dataview1 - 2030b]

File Edit Map Dataview Selection Matrix Layout Tools Procedures Networks/Paths Route Systems Planning Window Help

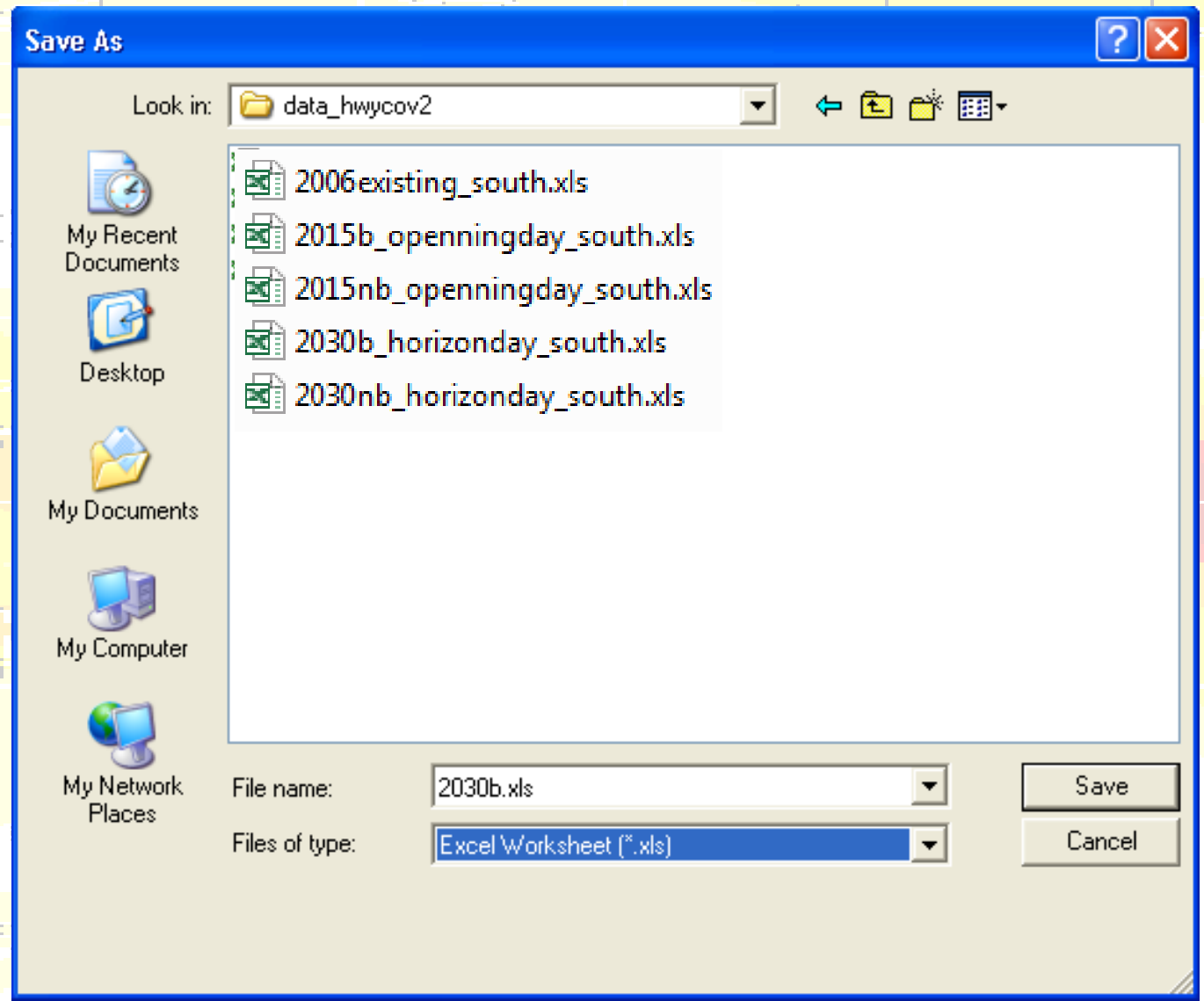
Selection: All Records

ID	QID	CCSTYLE	UVOL	AVOL	TMP1	TMP2	PLOT	SPHERI	
29312	0	1663.454500	28798	70942	74310	5	6000	1	144
29313	0	1415.075700	29556	13135	14924	2	4000	1	144
29314	0	1756.066000	29551	21888	23100	2	4000	1	148
29315	0	2116.493200	29553	12691	11669	2	2000	1	144
29316	0	525.247500	1549	12691	11669	2	2000	1	141
29317	0	2079.213100	1579	13675	14273	3	2000	1	144
29318	0	520.825260	1580	13675	14273	3	2000	1	144
29319	0	1717.554300	28793	46821	49917	3	6000	1	144
29320	0	5039.395000	20781	91730	95401	4	9200	1	144
29321	0	5447.880400	20762	95214	86338	3	9200	1	141
29322	0	2379.397000	29550	13675	14273	3	2000	1	144
29323	0	2757.960900	1548	12691	11669	2	2000	1	141
29324	0	1653.497200	26397	53868	49043	2	8000	1	144
29325	0	289.264190	25963	24766	22677	4	2000	1	148
29326	0	1705.424900	28806	74489	66342	3	8000	1	141
29327	0	1695.118700	29547	17872	16031	3	2000	1	141
29328	0	2044.027700	26012	17412	18312	3	2000	1	141
29329	0	373.960360	26398	91719	95481	3	10000	1	144
29330	0	735.060550	29751	23771	22231	3	4000	2	144
29331	0	1033.518300	663	23771	22231	3	4000	2	144
29332	0	742.440730	664	26856	26582	3	4000	2	144
29333	0	1755.576400	14269	110086	102016	4	9200	2	144
29334	0	3301.795200	14271	104735	102842	4	11200	2	144
29335	0	350.277650	29548	15316	15944	3	2000	2	144
29336	0	357.624180	24717	12661	12258	1	4000	2	144
29337	0	2201.267800	29748	26856	26582	3	4000	2	144
29338	0	1174.682600	24704	23771	22000	3	4000	2	144
29339	0	630.449220	29545	14888	13637	1	4000	2	141



Procedure

Save model runs
for each alternatives





Procedure

Data Preparing and Reformatting

- Run preAQ
- preAQ stands for **preparing data for AQ analysis**

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preAQ, an Excel macro to PREpare data for Air Quality analysis, uses regional transportation model results to calculate VMTs by speed by segment within a local project limit. The outputs of the macro can be used as inputs to run CT-EMFAC(v4.0) for MSAI studies. Please contact Hanwen Yi @ (619) 600-6314 or via hanwen.yi@dct.gov.ca for any questions or technical support.

Select a model/version to start

San Diego Regional Transportation Model

- Activity Based Model
- TransCAD/SR12
- TransCAD/SR10 or SR11
- TranPlan/SR10

Imperial County Transportation Model (ICTM)

- TransCAD/SCAG
- TranPlan/Caltrans



Find CT EMFAC(v4.0).exe



Save as/to a CT-EMFAC input workbook

Find the CT-EMFAC 'Input-Template' File

- Create a New Workbook
- Open an Existing Workbook

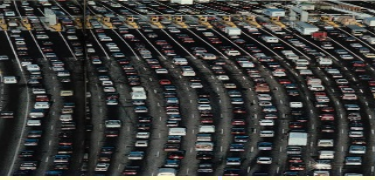
Project Name:

Select a Scenario

- Existing
- Opening Day No Build
- Opening Day Build
- Horizon Year No Build
- Horizon Year Build

Clear Data Sheet

Quit



Questions?